REMARKS

Claims 1, 11, 19 and 26 have been amended. Specifically, claims 1 and 19 have been amended to point out that the number of fish eyes having a diameter of at least 80 μm does not exceed 5 fish eyes/m^2 when measured under a microscope at a multiplication of 100 as supported by the disclosure on page 5, lines 15-17; page 13, lines 18-20; and page 18, lines 11-13 of the present specification. Claims 11 and 26 have been amended to replace the phrase "polyoxyalkylene dimethacrylate" with --polyoxyalkylene diacrylate-- as supported on page 9, lines 9-19 of the specification.

The specification has been amended to correctly describe that it is the "protecting film" that has the fish eyes that were measured as is supported on page 5, lines 15-17 and on page 13, lines 18-20 of the present specification because it is the protecting film (C) and not the support film (A) that has fish eyes.

Applicants assert that the amendment to the present application adds no new matter. Furthermore, Applicants respectfully request reconsideration of the present application and withdrawal of the rejections for the foregoing reasons.

The Invention

The present invention pertains to a photosensitive film such as would be used in metal etching fabrications for lead frames, metal masks, and the like. Specifically, the photosensitive film in accordance with one preferred embodiment of the present invention comprises a support

film (A), a photosensitive resin composition-containing photosensitive resin layer (B) formed on the support film, and a protecting film (C) stuck onto the photosensitive resin layer. The protecting film is further required to have the number of fish eyes having a diameter of at least 80 μm that does not exceed 5 fish eyes/m^2 when measured under a microscope at a multiplication of 100. In addition, the photosensitive resin composition-containing photosensitive resin layer has a film thickness of 5 to 30 μm.

The photosensitive film in accordance with the preferred embodiment of the present invention as recited in claim 1 is advantageous over the prior art photosensitive films because by limiting the number of fish eyes having a diameter of at least 80 μm to not exceed 5 per square meter when measured under a microscope at a multiplication of 100 the present invention necessarily limits the number of air voids formed when a photosensitive layer having a film thickness of 5 to 30 μm is used. In other words, by minimizing the number of relatively large fish eyes in the protecting layer, the photosensitive film of the present invention limits the number of air voids formed in the photosensitive layer. Because the presence of air voids causes the formation of defective patterns and the breakage of wire in the subsequent steps of exposure, development and etching (specification, page 3, lines 17-28) when manufacturing semiconductor elements and the like, it is desired that the protecting layer have as few relatively large fish eyes as possible. Applicants point out that only the photosensitive film according to the present invention is able to provide this advantage.

The Rejections

Claims 1-5, 7-10, 13, 14, 18, 19, 21-25, 28, 29 and 31 stand rejected under 35 U.S.C. 103(a) as unpatentable over Hilger (U.S. Patent 4,698,292) in view of Fifield (German document

DE 3,825,782 A1). Claims 1-10, 13-19, 21-25 and 28-35 stand rejected under 35 U.S.C. 103(a) as unpatentable over Taguchi (U.S. Patent 4,360,582) in view of Fifield. Claims 12 and 27 stand rejected under 35 U.S.C. 103(a) as unpatentable over Taguchi in view of Fifield, and further in view of Hoffman (U.S. Patent 4,710,446). Claims 11 and 26 stand rejected under 35 U.S.C. 103(a) as unpatentable over Taguchi in view of Fifield, and further in view of Hatanaka (U.S. Patent 6,133,343).

Applicants' Arguments

The Hilger reference discloses a photopolymerizable recording material that includes a transparent support film, a thermoplastic photopolymerizable photoresit layer, and a flexible covering film on the exposed surface of the photoresist layer (see Abstract). The support film is about 15 to 30 μm thick (col. 4, lines 42-45). The photopolymerizable layer includes a thermoplastic binder, polymerizable compounds (acrylic or methacrylic acid esters of polyhydric aliphatic hydroxyl compounds), and a photopolymerization initiator (col. 4, lines 45-50). The photopolymerizable layer also may include polymerization inhibitors, dyes, pigments, plasticizers and crosslinking agents, and is about 10 to 100 μm thick (col. 4, lines 50-54). In addition, Hilger discloses that the covering film is made of polyolefin (col. 3, lines26-28) and is about 5 to 25 μm thick (col. 4, lines 44-45).

First, Applicants do not believe that the "recording material" disclosed by Hilger is in the same field of endeavor as the present invention. Specifically, the main objective for Hilger is to provide a recording material that does not show any adverse squeezing out of the photopolymerizable layer at the material edges when stored in a roll (col. 1, lines 59-63). The subject matter of the Hilger reference has nothing to do with photosensitive films which can be

laminated by conventional pressure lamination methods onto a surface of a substrate that has a metallic surface for the purpose of providing a high product yield that has a high workability and a reduced number of air voids (specification, page 4, lines 22-27). Consequently, Applicants assert that the Hilger reference is directed to a non-analogous art, and that one skilled in the art of making photosensitive films for metal etching fabrication would not look to the art of making recording materials for technology.

Even if the Hilger reference where deemed relevant to the subject matter of the present invention (which it is not), the Hilger reference fails to teach a protecting layer that has the number of fish eyes having a diameter of at least 80 μm that does not exceed 5 fish eyes/m^2 when measured under a microscope at a multiplication of 100 as admitted by the Examiner (Office Action, dated November 27, 2001, page 3, lines 15-17). Applicants point out that the Hilger reference does not address the issue of the formation of air voids is related to the film thickness of the photosensitive resins layer wherein thinner photosensitive resin layers are more prone to the formation of air voids (specification, page 3, lines 22-25). Applicants believe that the Hilger reference is silent with respect to this phenomenon because the Hilger reference is directed to a non-analogous filed of endeavor where air voids are not a concern.

The Fifield reference discloses a dry film photoresist used in manufacturing PCBs that is formed as a roll including a photopolymerisable film (P) laminated between a base film (B) and a covering film (C), (see English Abstract). Fifield provides the general teaching that by avoiding low quality LDPE the roll is made more even because the covering film contains less gell and fewer inclusions, which reduces the number of indentations in the resist. In other words, Fifield discloses that by avoiding low quality materials, such as low quality LDPE, that the roll can be

improved. The Examiner erroneously concludes that because the Fifield reference discloses the desirability to make a roll more even by making the covering film with less gell and fewer inclusion, that it would be obvious to do so by any means. The flaw in the Examiner's reasoning arises from ignoring the fact that the Fifield reference discloses that "fewer inclusions" are attained by avoiding low quality LPDE by using high quality LPDE. The teachings of the Fifield reference can not be applied to the Hilger reference unless the recording material disclosed by Hilger is made with low quality LPDE. However, there is nothing in the Hilger reference that teaches, or even suggests, that the recording material disclosed by the Hilger reference is made with low quality LPDE. Therefore, not only is there no reasonable motivation to apply the teaching of the Fifield reference to the recording material disclosed by Hilger, but there is no reasonable expectation of success.

Applicants also point out that even if the Hilger and the Fifield references were properly combinable (which they are not), the combination would still fall short of the subject matter of the claimed invention because the combination of the Hilger and Fifield references only teach "fewer inclusions." It is not known what is the magnitude of "fewer inclusions" or what are the sizes of the inclusions. However, the present invention recites a protecting layer that has the number of fish eyes having **a diameter of at least 80 μm that does not exceed 5 fish eyes/m^2** when measured under a microscope at a multiplication of 100. As shown in Table 2, the present invention is directed to using a number of different protecting films (see Table 2) that provide remarkably flawless protecting films; however, these protecting films are not LPDE films.

Applicants remind the Examiner that in order to make a proper rejection under 35 U.S.C. 103, the following criteria must be met: (1) the prior art must teach a motivation to combine the

references, (2) the combination of the art must have a reasonable expectation of success, and (3) the combination must teach all of the claimed elements. *In re Vaeck,* 20 USPQ2d 1438, 1442. As shown by the Applicants, the Examiner has not established a single one of these three criteria.

Applicants also point out that the photopolymerizable film (P) adheres more strongly to covering film (C) that to the base film (B) so that the base film acts as a release film (see English Abstract). This is contrary to the present invention, wherein the protecting film is removed at the time of lamination (see Claim 3 and specification, page 14, lines 28 to page 15, line 13). Therefore, the covering film of the Fifield reference is retained in the roll together with the gell and inclusions, while in the present invention the protecting film is removed at the time of lamination on the substrate and is not retained together with the fish eyes. Thus, the mechanism and function of the covering film disclosed by Fifield is quite different from those of the protecting film of the present invention, and the combination of the Hilger and Fifield references is unreasonable since the object of the Hilger reference is to prevent squeezing out of the photopolymerizable substance during storage in a roll, while the object of the Fifield film is to make the roll surface of dry photoresist even by making the covering film contain less gell and fewer inclusions. In addition, the combination of Hilger and Fifield references does not accomplish the present invention since the protecting film is not retained in the final laminate, but is removed at the time of lamination on a substrate in contrast to the teaching of Fifield; and, air voids are not reduced remarkably according to the teaching of both references since both references have no inventive idea of reducing the air voids, which are derived from fish eyes in the protecting film.

Moving on, the Taguchi reference discloses a "photopolymerizable element" for producing photoresists used in manufacturing printed circuit boards that includes: (1) a layer of a photopolymerizable composition, (2) a film support laminated to the composition layer and (3) a strippable protective film (see Abstract). The thickness of the composition layer is 0.1 to 1,000 μ (col. 9, lines 15-19) with the thickness of the film support being 5 to 100 μ (col. 9, lines 20-22) and the thickness of the protective film being 8 to 80 μ (col. 10, lines 22-23). Numerous materials are available for making the protective layer, but there is no mention of using low quality LDPE. Taguchi discloses that the protective film is provided on one surface of the photopolymerizable layer and the film support is laminated onto the other surface, wherein the protective layer is used for preventing blocking at the winding step and adhesion of dust during handling (col. 3, lines 62-68). As admitted by the Examiner (Office Action, dated November 27, 2001, page 5, lines 7-8), the Taguchi reference does not teach "explicit details pertaining to the protective film" such as a protecting layer that has the number of fish eyes having **a diameter of at least 80 μm that does not exceed 5 fish eyes/m^2** when measured under a microscope at a multiplication of 100.

Applicants point out that the Taguchi reference does not teach making the protective layer from low quality LDPE; therefore, as discussed above there in no proper motivation for applying the teachings of the Fifield reference to make up the deficiencies of the Taguchi reference. In addition, the combination of the teachings of the Taguchi reference and the Fifield reference has no reasonable expectation for success because the Fifield reference provides no teaching for improving upon a protective layer unless the protective layer is made of low quality LDPE, and there is no teaching to support that the Taguchi protective layer includes this material. Lastly,

even if the combination of the Taguchi reference and the Fifield reference were improperly made for the sake of argument, the combination still would not teach a protecting layer with the number of fish eyes having **a diameter of at least 80 μm that does not exceed 5 fish eyes/m^2** when measured under a microscope at a multiplication of 100 because the Fifield reference is silent with respect to what size are the "inclusions" and is vague about what is the magnitude of inclusions that is achieved by avoiding the low quality LDPE. As evident from Table 2 of the present disclosure, the present invention achieves unexpectedly superior results by achieving a flawless protecting layer.

The subject matter of independent claims 1 and 19 are neither anticipated by, nor made obvious in view of, the Hilger reference, the Fifield reference and the Taguchi reference, either singly or in combination for reasons above. Applicants have shown that no proper showing of *prima facie* case of obviousness has been made. Specifically, the Applicants have shown that the Examiner's combination of the Hilger reference, or the Taguchi reference, with the Fifield reference (1) lacks proper motivation, (2) lacks a reasonable expectation of success, and (3) fails to teach the subject matter of the independent claims.

The two remaining references are briefly described, but neither can make up the deficiencies of the Hilger reference, the Fifield reference and the Taguchi reference. The Hoffman reference discloses a photosensitive recording material for lithographic printing plates or resists images (See abstract). Hoffman is noted to teach various photoinitiators (col. 6, lines 9-27). The Hatanaka et al. reference discloses a "resinous composition for dental use" and is directed to a non-analogous field of endeavor pertaining to the making of dentures, mouth pieces and temporary crowns (col. 1, lines 5-10).

Conclusion

For all of the above reasons, claims 1-19 and 21-35 are neither anticipated by, nor obvious in view of, the prior art of record because the Examiner's combination of the Hilger reference, or the Taguchi reference, with the Fifield reference (1) lacks proper motivation, (2) lacks a reasonable expectation of success, and (3) fails to teach the subject matter of the independent claims. Consequently, the Examiner's rejection is untenable and should be withdrawn, and the Applicants respectfully request that the application be reconsidered. Applicants believe that the present claims are in condition for allowance, and prompt notice of allowance is respectfully requested. Questions are welcomed by the below-signed attorney for applicants.

Respectfully submitted,

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Marked Up Claims

1. (twice amended) A photosensitive film which comprises a support film (A), a photosensitive resin composition-containing photosensitive resin layer (B) formed on said support film (A), and a protecting film (C) stuck onto said photosensitive resin layer (B), wherein the number of fish eyes having a diameter of at least 80 μm included in said protecting film (C) does not exceed 5 fish eyes/m^2 when measured under a microscope at a multiplication of 100; and said photosensitive resin composition-containing photosensitive resin layer (B) has a film thickness of 5 to 30 μm.

11. (twice amended) A photosensitive film according to Claim 2, wherein the monomer (b) is bisphenol A polyoxyalkylene ~~dimethacrylate~~diacrylate, or contains bisphenol A polyoxyalkylene dimethacrylate as a component.

19. (twice amended) A photosensitive film comprising a support film, a photosensitive resin layer on said support film, and a film stuck onto said photosensitive resin layer, wherein said film has fish eyes of a diameter of at least 80μm in a number not exceeding 5 per square meter when measured under a microscope at a multiplication of 100.

26. (twice amended) A photosensitive film according to Claim 23, wherein the monomer (b) is bisphenol A polyoxyalkylene ~~dimethacrylate~~diacrylate or contains bisphenol A polyoxyalkylene dimethacrylate as a component.

Marked up portion of Specification

After the exposure, the number of air voids on the substrate was counted under a microscope at a multiplication of 100. Further, the size and number of fish eyes on each protectingsupport film were measured under a microscope at a multiplication of 100.